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Suggestions on
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SUGGESTIONS ON RURAL HYGIENE.

RELATING PRINCIPALLY TO THE HOUSE AND ITS
SURROUNDINGS.

FOR LOCAL BOARDS OF HEALTH, LOCAL AUTHORI-
TIES, AND HOUSEHOLDERS.

CONNECTICUT STATE BOARD OF HEALTH.

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SUGGESTIONS ON RURAL HYGIENE.

A dry, well-drained site for a dwelling house is pretty generally conceded to be an essential requisite for a healthy home. The relation of damp, sodden foundations and wet, undrained surroundings to such diseases as rheumatism, diarrhœa, and consumption is recognized by nearly all intelligent persons, the facts relative to the latter disease having been demonstrated chiefly by Dr. H. I. Bowditch, of the Mass. State Board of Health.

But while the necessity for the removal of the excess of surface moisture has become a matter of general information, the reverse is true with reference to deep drainage, which is not so well understood even by physicians.

At a level, varying with the geological formation from a few feet to several hundred below the surface of the ground, we find the soil saturated, so to speak with water. This may be considered as a sheet of water moving toward the sea with a slow but uniform motion, and feeding rivers and other water courses perhaps as much as the brooks or streams which flow in upon the surface. This underground circulation of water is called subsoil or ground water. The latter term will be used in this circular. The level of the ground water at a river would be about the same as

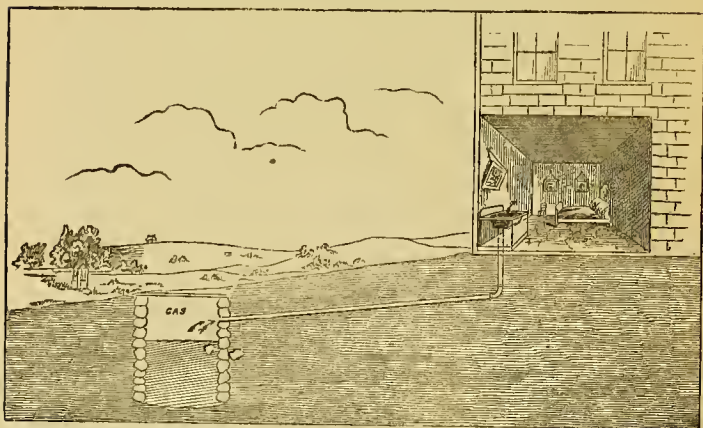
the bed of the river, gradually rising as you recede from the banks. Deep wells reach the level of the ground water, and their uniform level is a fair gauge of the level of the ground water. Retention of the ground water by natural or artificial means is one of the most fruitful sources of malarial diseases, which disappear when a free outflow is provided. One of the most striking examples in this country was furnished by the city of Detroit, where the mortality from epidemics of malignant malarial fevers was excessive, and epidemic dysentery and cholera prevalent, now one of the healthiest cities in the world, although naturally most unfavorably located, through thorough drainage and pure water supply.

A house upon a sandy hillside may be malarious, so to speak, or a hot-bed of consumption, while one near a stream or upon low land may be dry and healthy. In the one case the outflow of the ground water is obstructed, while in the latter entirely free and unimpeded. The unhealthfulness of many an apparently well located dwelling is thus accounted for. It is evident that in many instances town or even State action is requisite to secure deep drainage. In constructing a house, deep drains should be carried under the foundation walls entirely around the house, with one or more branches from the center of the cellar. These should in no case be used for sewage. Systematic drainage by towns will of necessity receive more attention as the causal relation of retained ground water to malarial and other forms of disease is recognized.

The atmosphere does not end with the surface of the ground, but fills the spaces between the particles of the soil unless displaced by other gases or water, and plays an important part in the chemistry of plant life; but as in the case of the ground water, the ground air, as it is called, is considered here only in its sanitary relations.

The soil about the house may be contaminated by soakage from leaky cesspools and privy vaults, and from decaying heaps of garbage and filth. The contamination of the ground air that results is more deleterious to health than the vile odors that may render the air disagreeable, but which are not particularly harmful. A house standing upon a gravelly foundation rests upon two-thirds small stones, one-third air. Now, as in this climate the houses are warmed a great part of the time, they act upon the same principle as a chimney, and suck up or draw in this ground air, which is colder than the air of the house, and influence thus a considerable area. Now, if the air, contaminated by contact with a soil polluted by kitchen or chamber slops, soakage from privy vault or cesspool, or any decaying mass or accumulation of filth in outhouses or surroundings is drawn into the house, as must of necessity happen if such sources of pollution exist, the air of the house is to this extent contaminated and devitalized, and becomes the predisposing cause of such diseases as diphtheria, cholera infantum, croup, catarrh, lung fever, consumption, and a host of minor ills that

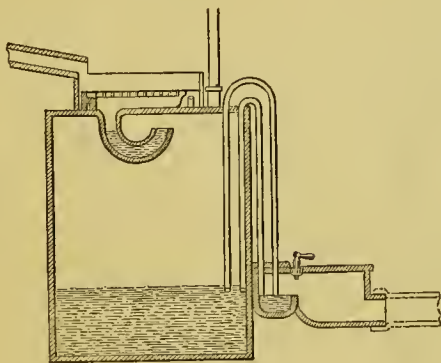
depress vital energy, lessen the working power, and shorten life. The products of decay from vegetable putrefaction in the cellar are by the same law of natural philosophy drawn up to devitalize the air of the occupied rooms.

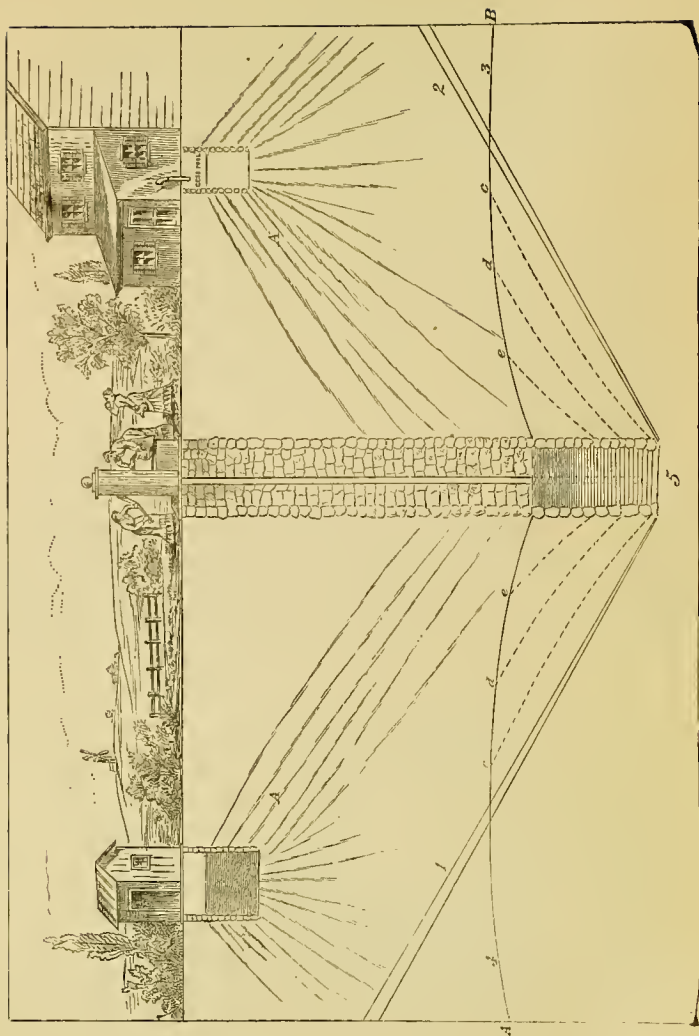


One of the most common sanitary defects of rural houses is illustrated in the above cut. A closed, unventilated cesspool communicates by an open, untrapped pipe directly with the house, so that all the gases of decay generated in the cesspool find their only outlet in the house, and are also drawn in by the difference in temperature already described. In other words, the house is used to ventilate the cesspool. In the instance from which this sketch was taken, the apparent result was the death of five children

from diphtheria ; three slept in a room adjacent, with the door open at night, two in the room above.

If cesspools are used they should be cemented water tight, ventilated thoroughly, and frequently emptied. The soil saturation resulting from ordinary careless methods sooner or later becomes a factor in the production of disease. The best method in a sanitary point of view is the absorption method. A series of porous tiles are laid a few inches below the surface, preferably of a lawn. These communicate with a flush tank, which empties itself automatically as soon as full with sufficient force to flush the pipes. This system has stood the test of time, and is well adapted for the sewerage of small towns where there is no public water supply. The following cut illustrates the tank mentioned. If it is desired to irrigate different plots, the tank can be connected successively with each set of drain pipes.





It is hardly possible to fix the limit for perfect safety for the distance that should exist between privy vault, cesspool, and well. It is safe to say that, if used at ordinary distances, both vault and cesspool should be cemented water-tight. The principles of drainage are practically recognized by every farmer, almost, who learns by experience that a drain draws from a larger area after it has been in place awhile, and that channels of communication are formed in the soil along which the water finds its way to the drain. Still it is seldom that they apply this to their wells, and we find outhouses situated within a few feet of wells, and the cesspool perhaps as near on the other side. A common error in this connection is to conclude that if the water from the well is clear, bright, and sparkling, and offends neither taste, sight, or smell, that it must be pure. The reverse, however, is the case, and water that is the most decidedly contaminated by the products of organic decay may be the most pleasant to sight and taste. Indeed, such water is often sought for its pleasant qualities, as was the case with the famous Broad street well in London, which communicated cholera to so many persons. The accompanying illustration shows pollution of soil and water by cesspool and privy vault. The lines 1, 5, 2, 5, outline the drainage area of the well, which in this case includes both vault and cesspool. The line A, B, indicates the level of the ground water, and the dotted lines show the local curves that would result in the level of the ground water if the well were drawn down.

The driven well, if driven deep enough, avoids contamination by surface water. The water from deep wells, when not contaminated by surface water, is of the best possible quality. Surface water may be excluded by laying the upper three-fourths of the wall of the well in cement.

Infiltration of the soil from the privy vault may be prevented by cementing the vault so as to be watertight. The earth closet system is to be unqualifiedly commended, and any one with the slightest ingenuity can construct one that will answer all requirements. An ordinary packing box and a large-sized coal hod furnish the requisite materials. If dry earth be not readily obtainable, ashes will serve equally as well. A corner of the box may be partitioned off to hold the earth or ashes, a seat and cover can be easily made, and for all practical purposes the result is equal to that achieved by the outlay of twenty-five to thirty dollars. The advantages and comfort of this system, especially in the winter months, for women and children, more than outweigh any slight trouble that may be involved. The pail system is well adapted for small towns where sewerage or the flush tank system are out of the question. If a general system for the disposal of this and other forms of filth cannot be made general throughout the town or village, a sanitary association or village improvement society might inaugurate the system, which, once started, would thenceforth be self-sustaining.

Excessive shading of house and grounds is not un-

common, and while shade trees add much to the attractiveness of a town or village, dense shading of the grounds or house induces dampness, and produces ill health by the exclusion of sunlight. The soil is often kept damp and unwholesome, and a constant decay of leaves and other vegetable substances near dwellings, by dense shrubbery. Fresh air and sunlight should have the fullest access to all the immediate surroundings of the house. In a sanitary view the elm, with its more open habit, is the better shade tree for streets and yards. Human beings require sunlight as well as plants. In the back yards, near the neglected sink drain, a rank, nauseous vegetation too often exists, and a filthy, damp, saturated soil.

If disinfectants are to be used, the best are copperas or sulphate of iron for privy vaults, garbage heaps, and the like, and a solution of the sulphate or chloride of zinc for cesspools and sink drains. The prompt removal of all filth before decay commences is the sanitary method. But as this cannot always be secured, disinfectants must be sometimes used ;—those mentioned are cheap, odorless, and efficient. Where the soil is saturated with grease or oil, the preliminary use of caustic potash may be requisite.

A saturated solution of copperas may be used,—that is, as much as the water will dissolve. From 8 to 10 ounces of the zinc salts to a gallon of water is a good solution. The chloride of zinc is strongly caustic in strong solutions ; the salts may be used separately or together.

